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AUTHOR Smith, Walter Scott
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ABSTRACT

The author presents some educational practices which, in his view, perpetuate the notion that some careers should naturally be pursued by women or by men and the idea that women and men as classes possess many group characteristics that go beyond genetically-based attributes. Suggestions are given for ways of encouraging women to pursue the broad range of all science careers, especially those which can be identified as traditionally male. Four strategies are described as means to increase the participation of women in science careers. First, educators should modify their own behavior or alter school practices which perpetuate outmoded myths about specific roles for women. Secondly, supplemental curriculum materials should portray women in a variety of science career roles. Science educators must encourage women into those science and math courses which have been avoided by too many women which will enable them to pursue collegiate science majors. Another strategy would be to acquaint women of all school ages with women already pursuing high level science careers, and the final strategy, a basic need for opening up the broad range of all careers for all women. (Author/EB)

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Increasing the Participation of Women in Science Careers

WALTER SCOTT SMITH
Assistant Professor of Education
Associate Dean of Women
University of Kansas

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For a variety of reasons, most high level science careers are not pursued by women in any large proportion. Women make up less than ten percent of American physicians, engineers, geologists, chemists, and physicists. Women have pursued the life sciences in greater numbers; but even in this area, women are concentrated in the health careers of nursing, dental hygiene, medical technology, physical and occupational therapy, and dietetics. Women are not found in large frequencies in the more prestigious health careers in which we refer to the practitioners as "Doctor". Medicine, dentistry, optometry, university teaching and research, and veterinary medicine are all traditionally male professions.

This is not to say that women are not pursuing science careers. Indeed, many women are pursuing selected science careers. For example, there are about 700,000 women nurses to about 300,000 male doctors. Furthermore, at least some women are successfully pursuing all science careers. Albeit in small numbers, there are women physicists, women oceanographers, women chemists, women engineers, women veterinarians, and the like. However, the point to be made is that for whatever reasons, women have been concentrated in those science careers which have lower education requirements, lower power and prestige, and lower income.

It is not my purpose today to recite to you the inequities which exist because of a person's sex. Both men and women are abused because of discrimination based on one's sex. All of us suffer from the consequences of our underutilizing women in science careers for which women possess abilities comparable to those of men.

My purpose, rather, is twofold. First, I will point out some of our educational practices which perpetuate the notion

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You are invited to correspond with the author at the Office of the Dean of Women, 222 Strong Hall, University of Kansas, Lawrence, Kansas, 66045.

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that some careers should naturally be pursued by women or by men and the idea that women and men as classes possess many group characteristics that go beyond genetically-based attributes. Secondly, I will suggest some steps which we educators can take to encourage women to pursue the broad range of all science careers, especially those which we can identify as traditionally male.

Sexist Educational Practices

In some quarters, sexist is a nasty word. I know some school people who cringe at the thought of any of their practices being labeled sexist. And, perhaps, they ought to cringe, for some sexist practices contribute significantly to women's, and men's, having a reduced range of choices of careers and other aspects of life style which lead to a meaningful and satisfying life.

I would define sexist educational practices as those teacher behaviors and aspects of the curriculum and school organization which are inequitably and unjustifiably applied to men and women. For example, formal and informal tracking of men and women into different courses, expecting different behavior of men and women, and using curriculum materials which portray men and women in stereotyped manners are all sexist practices, because men and women are inequitably and unjustifiably treated.

Textbooks, probably because they are readily available and easy to pin down, have been roundly criticized for the role models of women and men which the pictures and text provide and for their perpetuation of half truths about men and women. Look at your own science textbooks. Although some publishers are making an effort to change the way in which they portray men and women, the books which are generally available to our students show men as doctors and women as nurses, show men as engineers and women as secretaries, and show men as researchers and women as lab aides. We might argue that this portrayal of men and women is justified because these portraits represent the actual proportion of men and women in these careers. However, the image of men and women in textbooks has the effect of a moral imperative. In effect, when men and women are shown in a particular way in textbooks, in other books and magazines, and on television, then there is some imperative for our students to fit themselves in the mold. The way things have always been becomes the model for future behavior and little improvement results in increasing students' participation in new careers.

Textbooks portray women not only as pursuing a limited variety of careers but also as naturally possessing a specified set of characteristics. Textbooks, like many of us, are confused by sex and gender. Traits which in actuality are

learned and therefore are a part of our feminine or masculine gender take on the aura of having been inborn and therefore a part of our sex. Thus, upon reading some textbooks, it would seem that for some genetic reason women should, of course, perform domestic chores, should, of course, be dependent on males for decision-making and support, and should, of course, be artistically, but not mechanically, inclined.

When we consider textbooks and other curriculum materials in relationship to women's seeking to pursue high level science careers, then we must conclude both that textbooks do not provide adequate role models and that textbooks portray women as lacking qualities which would enable them to successfully pursue high level science careers.

While curriculum materials have done injustice to women, a more fundamental injustice, I believe, has been done by teachers in the classroom and by school policies which track women and men into certain courses and activities.

Listen and observe the classroom. How often we hear, "Isn't that just like a girl", or "John, you do this and Jane, you do that", or "Boys, be gentlemen". Too often teachers unconsciously expect different behavior and abilities of males and females. Boys are the manipulators, girls the observers. Boys are the leaders, girls the followers. Boys are good at math and science, girls are good at reading and writing. Boys can be messy, girls should stay neat.

Without too much difficulty, teachers can allow their men students to take the lead in our current "hands-on", activity-centered elementary science curricula, while women students are forced or drift into a back seat. Once the dichotomy of behavior has been established in the elementary grades, the official or unofficial tracking of women and men in the junior and senior high school is much easier. With the assistance of well meaning teachers and counselors, the high school women students, who otherwise have the necessary ability and prerequisites, are encouraged away from the science and math which are prerequisite to pursuing a collegiate science career major. Even if women do enroll in high school science and math, they are reminded in many ways of the assumed proper role of women. These women often are enrolled in the science and math courses so that they might be able to pursue nursing or similar careers or because high school science and math courses are part of the well rounded high school background of an intended liberal arts major.

Clearly, our schools have played a part in perpetuating the myths that women should pursue certain careers and possess certain characteristics. Schools are not the only offenders in this regard and nothing I say here should be taken to imply that schools are the only or necessarily the prime cause

for many women's not pursuing those high level science careers for which they possess the necessary ability. Parents, relatives, friends, television and other media, churches, and youth organizations, among others, contribute to the underutilization of women in high level science careers. However, one of the objectives of education ought to be to change people's behavior. Schools certainly are in a position to influence students to pursue courses of action which are not now the norm.

Increasing Participation of Women in High Level Science Careers

One of the objectives of our schools should be to increase the participation of women in science careers. In order to accomplish this objective, we can pursue four strategies.

First, we educators can examine our own teaching behaviors, school practices and policies, and curriculum materials. From this examination should spring an awareness of our own sexist practices which have contributed to the perpetuation of outmoded myths about the proper roles of women. Once we become aware of our own sexist practices, then we should make every effort to modify our own behavior or alter school practices. Because we usually are stuck with textbooks and other curriculum materials which are expensive to replace, we will need to develop supplementary materials which first, will correct the notion that women, in general, all have characteristics such as being dependent, unable to make decisions, and fearful of taking responsibility. Secondly, the supplemental curriculum materials should portray women in a variety of science career roles, rather than being limited to traditionally female careers.

Having suggested this first remedial method of ridding ourselves of sexist practices, I must say that I view this process as being necessary, but also as being relatively passive. Although getting ourselves and our colleagues to be aware of our sexist practices may be a difficult action, the end result - the stopping of sexist practices - is essentially passive. We simply stop doing that which we ought not to be doing.

In order to encourage women into careers for which they possess the necessary ability, we must take a more active approach which goes beyond simply stopping sexist practices. The remaining three strategies actively encourage women to participate in the entire breadth of science careers.

First, we science educators must positively encourage women into those science and math courses which have been avoided by too many women, but which will enable women to pursue collegiate science majors other than those few careers which have traditionally been reserved for women. This is not a time to steer women away from algebra, geometry, advanced math, biology, chemistry, and physics, for these courses will start to prepare women for entry into careers for which business and industry are aggressively recruiting women.

A second active strategy would be to acquaint women of all school ages with women already pursuing high level science careers. As we pursue our career education schemes of acquainting students with career options and helping them make choices, we must be sure to include role models of women doctors, women engineers, women researchers, and so forth. In the high school, our women with science ability must have the opportunity to visit and talk with some women scientists. Apprenticeships, clubs, or special summer school programs are techniques we could use.

We have all sorts of male role models available for our male students to emulate. With no effort on our part, high school males with science ability are able to find doctors, engineers, and researchers with whom they can identify. Therefore, we can procede with our plans to provide women science career models without fear of slighting the men.

Although the procedures of encouraging women into science and math courses and providing new women role models should broaden the science career choices of women of ability, these techniques cannot enjoy broad success until we institute a third strategy. Women must become aware of and be enabled to deal with barriers to women's pursuing traditionally male careers. These barriers have been erected by society and women have incorporated some barriers into their own psyche. This final strategy, in my view, is a basic necessity for opening up the broad range of all careers for all women. Our schools should take the responsibility for enabling women to overcome those barriers which traditionally have severely limited the career choices of women.

The barriers to which I refer may be divided into two types, although the categories are not mutually exclusive. There are social barriers which limit the career possibilities of women, even when women attempt to pursue the broad range of career possibilities. Also, there are personal barriers existing within some women which prevent them from attempting to pursue any career, other than possibly those which have traditionally been the province of women.

One of the first social barriers which a woman encounters are the expectations of others about a woman's proper role. Parents, relatives, friends, and teachers explicitly expect women to pursue a limited range of careers, if women should pursue any career at all. These people reinforce a woman's move toward a traditional career and make difficult a non-traditional career choice. How often we hear, "That's not women's work", or "You'll take jobs away from the bread winners, dear", or "Women aren't serious about a career", or "It's just not in the nature of a woman", or "What about the kids?" The explicit expectations of women represented by these statements are reinforced by implicit expectations presented through the media and textbooks, as we have mentioned.

Another social barrier is the career recruitment system which favors men over women. For example, a usual method of getting candidates for a job has been the "old buddy" system. When using this method, the employer inquires among his fellow practitioners for the names of likely candidates, rather than broadly announcing the position so that all prospective candidates might learn of the opening. The result has been an inbred recruitment pattern which has worked to the exclusion of women and minorities.

Once having entered a career, yet another barrier impedes the advancement of women. Promising young men have been taken under the wing of more established practitioners, leading to the proteges' having increased opportunity for success in the field. On the other hand, women have not been selected as proteges, resulting in a lack of opportunity.

Unlike men, many women do not view the choice of a career as their basic life style decision. Many women put off or entirely avoid such a decision. Even when a decision to pursue a particular career is made, the career choice is seen as having to be accommodated to choices in marriage and family. Many women plan to subordinate themselves to their husbands' pursuit of career. Further, many women assume their husbands will support them and make a career for the wife unnecessary. Even the selection of a particular job often is not viewed by a woman as fitting into the pursuit of a career. Thus, perhaps the basic personal barrier to women's pursuing a wide breadth of careers is women's not choosing to make career choices.

Other personal barriers to choosing any of the traditionally male careers, including many science careers, are found in the unwillingness of some women to assume responsibility, their aversion to success, and their lack of confidence. Some women, like some men, when faced with the competitive situation, respond by dropping out or avoiding a potentially successful course of action.

I do not mean to make a blanket condemnation of women. In fact, many women are choosing to make career choice a basic decision for themselves. Many women are attempting to match their abilities and interests with the broad range of possible careers, rather than the limited range traditionally reserved for women. Many women are striving for success, taking responsibility, and asserting themselves in competition with others.

Despite the fact that many women are overcoming barriers, if we are to increase the participation of women in all science careers, then our high schools must make particular efforts to enable women to overcome barriers and we must insure parental and peer support in this effort. If women of ability are enabled to overcome these barriers while still in high school, then these women should be able successfully to enter collegiate instructional programs for all high level science careers.

High schools should embark on a two pronged assault on overcoming the barriers which I've outlined. First, women with ability in science and math should be identified and invited to enter special programs, in which these women are made aware of the barriers which exist in society and within themselves and in which they make life plans to overcome the barriers. Through these programs, women students will become mutually supportive in their new career choices. The second prong of the attack should deal with parents, who have a large influence on women's career choice or lack of choice. Parents should be made aware of their outmoded notions which limit the career options of their daughters and parents should acquire a more realistic picture of women's career patterns - one which takes into account the increasing demand for women in a wide breadth of careers.

No single strategy nor any single agency will turn around our traditional pattern of essentially limiting women to a handful of careers. However, by our actively assisting women to overcome barriers to career choice, the schools will make a significant contribution to their women and men students.